



What is Forth?

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What is Forth?

- Forth is a list processor.
- Forth has a set of commands and a text interpreter to process lists of commands.
- Forth commands are records linked into a dictionary.
- Each record has a link field, a name field and a code field.



Forth Interpreters

- Outer interpreter interprets lists of commands in text form.
- Inner interpreter interprets lists of commands in token form.



Two Types of Commands

- Primitive commands have machine code in code fields
- Compound commands have token lists in code fields
- Token lists can be nested indefinitely to solve all computable problems



Two Modes in Text Interpreter

- Interpreting mode in which command lists are parsed and executed
- Compiling mode in which command lists are compiled into token lists



Forth Compiler

- Forth compiler is text interpreter operating in compiling mode
- Forth compiler creates a new compound command, which is a token replacing a list of tokens



Forth Compiler

- All computable problems can be solved by repeatedly compiling new commands from lists of existing commands:

```
: <name> <list of commands> ;
```



Foundation of List Processing

- Fundamental reason that Forth commands can form simple, linear token lists is that Forth has two stacks.
- Return stacks to store nested command return addresses
- Data to store parameters passed among nested commands



Tokens and Structures

- The concept of token must be expanded to include structures
- Structures can be linked linearly like tokens
- Inside structures there are branches, loops, integer literals, and string literals.



Structures

- Structures are sublist of tokens, and they can be linked linearly inside a list.
- Forth compiler can be stated:
: <name> <lists of structures> ;
- Grammatical rules are only necessary to compile structures and literals



eP32 as a Forth Engine

- Two stacks
- Single cycle subroutine call instruction
- Single cycle subroutine return instruction
- In Subroutine Threading Model, tokens are simply subroutines call instructions
- eP32 is the best list processor